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A Survey on Students' Confidence in Reading Physics Research in English

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Abstrak: By assessing the reading confidence levels of physics students, this study investigates the primary obstacles influencing their understanding of English-language research publications. A structured questionnaire measuring four aspects of reading confidence scientific vocabulary and terminology, comprehension of research article structure, application of reading strategies, and critical reading and interpretation was used to gather data from 64 physics students using a quantitative descriptive approach. The findings show that students had a moderate level of trust in their ability to understand scientific terminology (M = 3.32–3.34), indicating that comprehension is nevertheless hampered by new technical jargon. Meanwhile, students reported a high level of confidence in identifying research structures, applying reading strategies, and performing critical interpretation (M = 3.4 However, this confidence was not always accompanied by a thorough understanding of scientific material. These results suggest that limited mastery of scientific terminology and the complexity of academic language significantly contribute to students' reading difficulties. In order to boost discipline-specific vocabulary, enhance students' comprehension of English-language physics research articles, and improve reading skills, this study suggests implementing more focused English for Specific Purposes (ESP) education.

INTRODUCTION

The English language is highly important in writing science, communicating science, and publishing internationally; thus, it has become an important language for students of physics. Proficiency in English enables students to draw upon the latest research results from around the world and keeps them up to date with frontier knowledge of the field and technological advances (Zaitun Qamariah & Hadma Yuliani, 2024). However, empirical evidence from Indonesian university contexts shows that many students struggle to achieve internationally recognized English proficiency levels, with average scores on standardized tests such as TOEFL remaining below global norms and challenges noted in learners' strategies to improve their language skills (Parmadi & Kepirianto, 2023). Therefore, improvement in English proficiency is required for the purpose of effective use of physics literature.

These include, among other psychological factors, such as self-confidence and language skills. Whereas Elisa (2024) indicated that self-efficacy in reading has impacts on an individual's comprehension because it provides him or her with control

over an individual's feelings regarding the text, activation of previous knowledge, and the development of confidence in one's perception of the text; hence, students who have higher levels of self-concept tend to be more able to understand academic texts in a proper way, leading to better reading skills (Putri et al., 2024).

However, the effect of reading self-efficacy becomes more relevant in conjunction with demands associated with studies in physics, entailing understanding scientific literature in English. (Zaitun Qamariah & Hadma Yuliani, 2024) mentioned the relevance of proper competence in the English language to students of physics education for writing scientific literature and sharing knowledge within the international researcher community. Besides, ESP-based learning of the English language in higher education has been considered necessary in order to equip students with the professional and academic requirements of their respective scientific fields (Syandri, 2023). Such findings therefore imply the necessity of institutional support in strengthening the skills of the English language to enable physics students to participate both academically and professionally.

Reading physics scientific journals in English, students need to have the necessary language competence to understand scientific concepts that are subtler, a requirement supported by findings from studies showing that language barriers significantly hinder the ability of second-language learners from comprehending physics content (Shubani & Mavuru, 2022). Indonesian students experience common difficulties such as limited vocabulary, poor reading strategies, and limited reading of scientific literature, while linguistic, pedagogical, and sociocultural factors weaken their reading proficiency even further (Rezaee et al., 2025). On top of these is that limited availability of academic reading resources further exacerbates such difficulties, narrowing the ability of students to develop their language proficiency continuously (Nurfithri, 2025). Taken collectively, these highlight that difficulties with reading in English physics texts are multi-dimensional in nature and that such skills need to be nurtured to raise the academic reading competence of students.

Recent evidence has shown that students still struggled to read English academic texts because they have a limited vocabulary and ineffective reading strategies. The low performance of the students in reading was reportedly caused by grammar and vocabulary mastery, which was limited by (Sumedi & Putri, 2025) to a number of factors. This is supported by the study of Sri Dafiyanti, Endang Susilawati, Eni Rosnija, showing that the use of reading strategies has a positive relationship with the ability of students in reading comprehension, so that students who use appropriate reading strategies will get better results in reading academic texts. Therefore, vocabulary and reading strategies are the two main constituents in improving reading skills.

Research in physics education rarely explores psychological aspects such as reading confidence when engaging with English-language research journals. Most of the previous research has focused more on the subjects of language proficiency or scientific concept comprehension without deeply understanding psychological aspects such as reading confidence, as pointed out by Pribadi et al. (2023). Lewis et al. (2025) also discussed how, although there is still a scarcity of empirical research on the topic, exploration research among physics and astronomy students reveals that reading assignments that include clear summaries increase students' confidence in their ability to read scientific literature. In this respect, there is an identified lack of

research in the area of how self-efficacy influences the interest of physics students in reading.

This grossly affects the ability of students to read English-language physics journals. Students cannot comprehend academic material, let alone participate in research activities. Many writers have argued that a common language, such as English, used for scientific research is a problem for students who are not first-language speakers of the language because they contribute little to international scientific publishing and citations (Amano et al., 2023). Besides, previous research by Wulff (2024) found that differences between colloquial and scientific language significantly hinder students' comprehension of science-related texts. Understanding these gaps in knowing how to employ different strategies.

LITERATUR REVIEW

Two of the most important ideas in literature are self-efficacy and confidence because they explain how the emotions and schoolwork of students are impacted. According to (Zimmerman, n.d.), self-efficacy is that which helps students determine what things they are capable of doing, how to handle problems, and how to handle school situations that are stressful. This point of view is supported in theory by recent research. For example, when individuals lose faith in themselves and their self-capabilities, they begin to doubt themselves, anxiety builds up, and grades begin to fall. (Dafiyanti et al., n.d.) conducted research showing college students who believe in their self-abilities are less likely to experience school-related stress. Aji and Widyastuti (2019) also found that self-efficacy impacts the feelings and performance of students in school as a result of its ability to make one believe in his or her own abilities, thereby managing school stress and achieving goals regarding education. These findings presented indicate that self-confidence holds a significant place in the lives of students with regard to performance at school.

People often think of reading as an interactive process in which understanding grows through ongoing interaction between the reader, the text, and the context (Grabe & Stoller, 2002). The ESP framework looks at what you need to know before you can read in certain fields, like physics (Hutchinson & Waters, 1987). On the other hand, Swales (1990) stresses how important it is to be able to spot rhetorical strategies in scientific writing. Recent studies show that this is true by showing that active reading strategies make students more interested and help them understand better (Bjedov & Mutshaus, 2024; Phichiensathien, 2021). Students' self-efficacy and cognitive strategies generally affect their understanding of physics research texts.

Research questions:

1. What is the overall level of students' confidence in reading English-language physics research article?
2. Which reading aspects most strongly shape students' confidence?
3. What factors influence students' confidence in reading physics research written in English?

Thus, the purpose of this study is to characterize the degree of confidence that physics students have when reading research articles written in English and to pinpoint the important elements and variables that affect this trust. The study specifically looks at students' confidence in a number of reading dimensions, such as

scientific vocabulary and terminology, comprehension of the structure of research articles, application of reading strategies, critical reading and interpretation, and the use of English research articles for academic writing and reporting. By tackling these goals, this study aims to offer empirical insights that can guide the creation of more successful English for Specific Purposes (ESP) training for physics students.

RESEARCH METHODS

The method applied for this study is a quantitative descriptive survey design with a cross-sectional approach. According to *Creswell (2014)*, a survey research approach is designed to obtain numerical data from a sample at a particular point in time to describe some existing trend, attitude, or characteristic of the population. Along these lines, Fraenkel and Wallen (2012) identify descriptive designs to be suitable for studies that aim to get an accurate description of participants' perceptions when treatments are not administered to participants, nor are variables manipulated. Based on these theoretical perspectives, this article identifies students' confidence in reading English-language physics research journals and factors that may influence it. This kind of design therefore enables the researcher to portray an actual condition faced by students in their academic work and subsequently helps the development of relevant insights which can thus lead to instructional strategies regarding how to enhance reading confidence.

The study collected data from high school students and physics education students at several universities. High school students filled out the questionnaire, and the university participants were in their first to seventh year of study. In total, 64 people took part. The research took place in October 2022.

This study used purposive sampling to strategically select physics students who had direct experience reading English-language research journals so that participants would provide relevant insights to the research problem. Being purposive means, it is done with a particular aim or intention in mind. Thus, this technique enables the researcher to decide on the participants based on criteria of relevance for the research objectives, so the information becomes richer, more specific, and appropriate according to the context of the research conducted (Asrulla et al., 2023; Lenaini, 2022; Nuralim et al., 2023). This technique enables a researcher to choose from respondents/informants who are relevant and have characteristics according to the research objectives, so that the data obtained is expected to be rich, specific, and contextual. According to Subhaktiyasa (2024), through purposive sampling, a researcher can also be able to focus on the group or person which is most appropriate for the research objectives and therefore produces richer and more specific information.

A stratified ranking survey of a Likert-type will be carried out to determine the confidence level of physics students in reading English-language scientific journals and will serve as the main instrument. In addition, one of the important issues in this study is what options can be provided for the Likert items in the survey data. A good Likert scale uses response options symmetrically and represents various levels of agreement/disagreement so that respondents can clearly express their attitudes, and researchers get more accurate data. For ranking scales, items are broken down into specific indicators and provided with graded response options

ranging from very negative to very positive, facilitating nuanced measurement of constructs in educational research (Koo & Yang, 2025).

The development of this instrument is based on the ideas of several scholars, which are used to create the vocabulary, article structure, reading strategies, and critical literacy parts of the instrument. The vocabulary section is based on what Nation (2001) and Hyland (2002) say about the importance of knowing scientific terms for understanding physics texts in English. This tool, then, measures how sure students are that they can recognize, understand, and use these terms. Also, the way the scientific article is set up in the tool is based on Swales' (1990) genre analysis idea and Flowerdew's (2013) explanation of how each part of the article works as a rhetorical tool. This is how we can tell if students can follow the logical flow and organization of physics research texts. The reading strategy's part is based on the ideas of Carrell and Eisterhold (1983) and Anderson (2003), which stress the importance of skimming, scanning, contextual inference, and metacognitive strategies for understanding difficult academic texts.

This instrument includes a critical literacy component based on Wallace (1992) and Hyland (2006), who argue that being able to judge the strength of arguments, bias, and reliability of data is an important part of being a good academic reader. The items in this section are meant to measure how confident students are in their ability to critically read physics articles. The last part, self-efficacy, is based on Bandura's (1997) theory, which says that self-efficacy affects how well someone can understand and write scientific texts. Referring to this theory, this tool measures how well students think they can use English-language physics articles for schoolwork by citing, summarizing, paraphrasing, and using them. In general, all parts of the instrument were made based on expert theories. This is also true for the structure and items of the questionnaire in the file. This makes sure that the theoretical basis and the measurement tool match up.

This study used purposive sampling to strategically select physics students who had direct experience reading English-language research journals so that participants would provide relevant insights to the research problem. Being purposive means, it is done with a particular aim or intention in mind. Thus, this technique enables the researcher to decide on the participants based on criteria of relevance for the research objectives, so the information becomes richer, more specific, and appropriate according to the context of the research conducted (Asrulla et al., 2023; Lenaini, 2022; Nuralim et al., 2023). This technique enables a researcher to choose from respondents/informants who are relevant and have characteristics according to the research objectives, so that the data obtained is expected to be rich, specific, and contextual. According to Subhaktiyasa (2024), through purposive sampling, a researcher can also be able to focus on the group or person which is most appropriate for the research objectives and therefore produces richer and more specific information.

The data collection is, therefore, a six-stage systematic procedure, beginning with instrument development and validation and concluding with data preparation for analysis in order to validity of findings and ensure the reliability on students' reading confidence. Each stage is carefully designed to maintain consistency and minimize potential sources of bias, from the construction of questionnaire items to testing their clarity and internal coherence. These steps are important, as they help make sure that

it accurately measures the constructs related to students' confidence in reading English-language physics research articles. This structured process will therefore yield data that is credible and trustworthy, one on which a strong foundation can be built for subsequent statistical analysis and interpretation.

The data collection process was carried out through a systematic six-step procedure to ensure validity and reliability. First, a questionnaire was compiled based on confidence indicators derived from relevant theories. Second, content validity was tested through expert judgment to confirm the appropriateness of the items. Third, a pilot test was conducted to evaluate the clarity and consistency of the instrument. Fourth, the validated questionnaire was distributed to the selected participants. Fifth, responses were collected and organized for analysis. Finally, the completeness and accuracy of the data were checked before proceeding to statistical analysis. This structured approach ensured that the instrument accurately measured students' confidence in reading English-language physics research articles and minimized potential sources of bias.

The data from the questionnaire will be analyzed using descriptive statistics to determine the average level of self-confidence of students and to find out which factors influence it the most. In such a way, the paper will give a clear perspective on students' confidence while reading English-language physics research articles. Descriptive statistics allow researchers to summarize numerical data in a straightforward way so that many characteristics, such as trends and variations, be easily identified and interpreted.

RESULTS

The results of our group's questionnaire on confidence in reading physics research in English revealed 64 responses from physics students. The study covered five distinct themes: understanding vocabulary, reading and understanding research structure, applying reading strategies, critical reading and interpretation, and using English research for academic writing and reporting. The data obtained from these themes is presented in the Table below.

Table 1. Descriptive Data of Overall Survey Results

Serial Number	Theme	Number of Statements	Mean	Level
1	Confidence in Understanding Vocabulary and Scientific Terminology	10	3.32	Moderate
2	Confidence in Understanding Vocabulary and Scientific Terminology	10	3.34	Moderate
3	Self-confidence in Reading and Understanding Research Structure	10	3.45	High
4	Self-confidence in Applying Reading Strategy	10	3.45	High
5	Self-confidence in Reading and Critical Interpretation	10	3.45	High

Descriptive analysis on the table shows that the level of confidence in the respondents in understanding vocabulary and scientific terminology is in the moderate category, with mean values of 3.32 and 3.34. This hints that respondents'

understanding of scientific terms is good enough, although their confidence in the area still needs to be improved. In contrast, three other themes—the confidence in reading and understanding research structure, implementing reading strategies, and the ability to read and perform critical interpretations—received a 3.45 mean value that is categorized high. The findings suggest that respondents feel more confident in more complex academic reading skills. Overall, the survey results show that the aspect of understanding scientific vocabulary is still at a moderate level, while the ability to read that is analytical and strategic has developed well. Here for the table-table below to see each theme that has questions with the highest and lowest average scores.

Table 2. Confidence in Understanding Scientific Vocabulary and Terminology

Statment	Category	Mean Score
I can recognize the meaning of complex physics terms even without using a dictionary.	very confident and sure	3.02
I am familiar with the abbreviations and symbols used in English-language physics articles.	quite confident	3.49
I can relate physics terms in English to their Indonesian equivalents.	unsure/indifferent and quite confident	3.49

Based on the analysis of the second table regarding understanding of scientific vocabulary and terminology, the average score was 3.49. The value reflects that students, especially in physics education programs, have a fairly good confidence in understanding the abbreviations and symbols present in the English physics article, but they still tend to be less confident or neutral when trying to associate the term physics in English with its translation in Indonesian. Meanwhile, the lowest average score of 3.02 showed that students feel confident to recognize the meaning of complicated physics terms even without the help of a dictionary.

Table 3. Self-Confidence in Reading and Understanding Research Structure

Statment	Category	Mean Score
I can identify the main findings in a physics paper without translating everything.	very confident and sure	3.06
I can understand how English writers express hypotheses and conclusions.	unsure/indifferent	3.55

The third table shows a discussion of confidence in reading and understanding research structures. The table results show that students have a low or moderate level of confidence in understanding how authors express hypotheses and conclusions in English, with an average score of 3.55. The findings indicate that students are still having difficulty understanding hypothesis presentation and conclusions in the English-language research text. Meanwhile, the lowest average score of 3.06 showed that only a small percentage of students feel confident and confident are able to identify the main findings in a physics paper without having to translate the entire text.

Table 4. Self-Confidence in Applying Reading Strategies

Statment	Category	Mean Score
I can skim through an English physics paper to get the main idea.	Strongly disagree	3.39
I can take effective notes when reading an English physics paper.	Strongly disagree and strongly agree	3.39
I can understand how English writers express hypotheses and	Unsure/Indifferent	3.52

conclusions.

The results of the analysis in Table 4 illustrate students' confidence in applying reading strategies. A statement with the highest average score, which is 3.52, suggests that students have relatively low levels of confidence or are in the category of understanding how English-speaking authors convey hypotheses and conclusions. Meanwhile, statements with an average score of 3.39 showed that students tend to disagree completely that they are able to read at a glance in English-speaking physics papers to acquire the main idea, but tend to agree that they can make effective records when reading English-speaking physics papers. The findings indicate that some students have been able to effectively implement their listing strategies in reading English-language physics articles.

Table 5. Confidence in Reading and Critical Interpretation

Statment	Category	Mean Score
I can express my opinion about the quality of English-language physics articles.	Strongly agree	3.26
I can determine whether the data in a research paper supports its conclusions.	Fairly confident	3.67

Table 5 describes student beliefs in reading and performing critical interpretations. An average score of 3.67 showed that students had a high level of confidence in assessing whether the data presented in a research paper supported the resulting conclusions. Instead, the statement “I can express my opinion on the quality of English-language physics articles” earned a lower average score of 3.26. The findings indicate that students are more accustomed to evaluating the linkages between data and conclusions in research papers than to present critical assessments of the quality of English-language physics articles.

Table 6. Confidence in Using English Research for Academic Writing and Reporting

Statment	Category	Mean Score
I can express my opinion about the quality of English-language physics articles.	Strongly agree	3.32
I can determine whether the data in a research paper supports its conclusions.	Unsure/Indifferent	3.55

The results of the analysis presented in Table 6 show students confidence in utilizing English-language research for academic writing and reporting purposes. An average score of 3.55 indicates that most students are still at a less confident or neutral level in assessing whether the data contained in a research paper supports the conclusions submitted. In addition, in the statement “I can express my opinion on the quality of English-language physics articles”, few students choose the category strongly agree, reflected in the lowest average score of 3.32. Overall, the findings suggest that some students still have difficulty conveying their assessments of the quality of English-language physics articles.

The results of the study indicate that physics students' confidence in reading English research articles is in the moderate to low category, characterized by a dominant response of "not sure/neutral" with a percentage ranging from 42.8% to 50.8% and an average score ranging from 3.02 to 3.67. This finding indicates that students do not yet have strong confidence in understanding English scientific texts. In addition, there are three main aspects that most influence their confidence, namely

mastery of scientific vocabulary and terminology, understanding the structure and organization of research articles, and critical reading and interpretation skills. These three aspects show the highest level of uncertainty and are determining factors for students' ability to understand scientific content. Furthermore, this study found that students' confidence is influenced by three main factors: minimal exposure to English scientific articles, limited mastery of technical physics vocabulary, and academic reading strategies that have not been optimally developed. These factors collectively impact students' low confidence in reading and understanding English physics research articles. Respondent analysis indicates that students need to be developed through English for Specific Purposes (ESP) instruction.

DISCUSION

This study's results suggest that physics students' self-assessed competence in reading English research articles does not always align with their actual level of comprehension, particularly in understanding technical terms and dense academic texts. Particularly in EFL settings, where students are expected to interact with global scientific literature, the disparity between students' self-reported confidence and their actual reading competency has important implications for physics instruction in EFL contexts.

The results demonstrate that students' confidence in comprehending scientific terminology was moderate, with mean scores ranging from 3.32 to 3.34. This indicates that students continue to experience difficulty understanding technical terminology and often rely on strategies such as literal translation, dictionary consultation, and contextual inference, which slow down reading and do not fully resolve comprehension difficulties. This finding is consistent with Bandura's (1997) self-efficacy theory, which states that confidence develops through mastery experiences and successful task engagement. Students' self-efficacy in reading scientific materials remains unstable due to limited exposure to English-language physics publications, which restricts their mastery experiences.

However, when asked about their confidence in reading strategies, critical interpretation, and identifying the structure of physics research articles, students reported high levels of confidence (M = 3.45). This suggests that students are familiar with the IMRaD structure and other basic academic conventions. This conclusion aligns with Swales' (1990) Genre Analysis Theory, which argues that understanding research article structure facilitates information retrieval However, strong structural awareness does not necessarily indicate a deep understanding of each section's rhetorical function. It is in line with the findings of Muslih et al. (2024), who discovered that students frequently identify structural aspects superficially but have difficulty making logical connections between procedures, outcomes, and analysis.

Additionally, despite reporting high confidence, students appear to demonstrate more perceptual than procedural competence in applying reading strategies and critical interpretation. Dense scientific language with complicated sentence structures is still a challenge for many students. This finding aligns with the Academic Reading Challenges in Higher Education (2024) study, which shows that EFL students may report high confidence despite lacking the linguistic resources required for deep analysis. Repetition of analytical problems in class may boost confidence despite

poor actual comprehension abilities, according to Bandura (1997), who notes that self-efficacy can be influenced by earlier learning experiences.

These findings highlight the importance of discipline-specific English for Specific Purposes (ESP) instruction. Scientific literature, according to Simson and Thilagam (2020), scientific literature frequently requires specialized discourse and technical language, making conventional reading strategies insufficient. To bridge the gap between perceived confidence and actual reading competence, targeted ESP instruction is necessary. Such instruction should integrate physics content, vocabulary development, and strategic reading practice. Student engagement with worldwide scientific literature can be enhanced through the development of more accurate self-efficacy and better comprehension, which can be achieved through the provision of structured exposure to actual physics research papers and the reinforcement of scientific language knowledge.

CONCLUSION

The results of this study indicate that physics students generally have moderate to low levels of confidence in reading English-language research articles, primarily due to the predominant uncertainty in understanding the scientific content. This study found that aspects such as mastery of scientific vocabulary and terminology, understanding of the structure of research articles, and critical reading skills play a significant role in shaping this level of confidence. Furthermore, low exposure to English-language scientific articles, limited mastery of technical terms, and underdeveloped academic reading strategies are key factors influencing students' confidence when interacting with scientific texts. Overall, the findings of this study close the knowledge gap regarding how students' confidence is formed in the context of academic reading and emphasize the need for the development of ESP learning that is more focused on the needs of the field of physics to improve students' reading competence and readiness to access international scientific literature.

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